

Connecting to professional knowledge¹

Jens-Christian Smeby

Abstract

Studies of students' educational outcome tend to be based on rather simple input output models. The aim of this paper is to demonstrate that a better understanding of professional knowledge and the longitudinal characteristics of learning processes are important also in quantitative studies. It is suggested that "connection to knowledge" and "wanting structure" are appropriate concepts in this respect. Results from a questionnaire study among college students show that students' expected educational outcome in terms of specific knowledge, practical skills and reflexivity when they enrol are positively related to their connection to the respective aspects of knowledge in the final term of study. The analyses also indicate that students' experiences of lacks in their professional knowledge should not only be interpreted as weaknesses of educational programmes; it could also indicate that the students have developed a wanting structure and that they have realised the need for continuous improvement of professional knowledge.

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Introduction

One of the key characteristics of professions is that they are knowledge based occupational groups. During the last 30-40 years education in the professions has increasingly been formalised and institutionalised. Professional education in the “semi professions” has moved from a “vocational” model to an “academic” model. At the same time the educational institutions have been upgraded to become part of higher education. Educational training institutionalised in universities or university like institutions are considered highly important in the development of a critical attitude to knowledge and professional practice (e.g. Freidson 2001). Students learning is however a challenge to educational institutions. Concepts like “expanded” (Engeström 1994) and “connective learning” (Young 1998) stress the importance of contexts of criticism, discovery as well as practical applications to develop these types of knowledge and skills. How professional knowledge is developed in college therefore deals with the very heart of professionalism.

Higher education research has focused on impacts of individual and contextual factors on students’ educational outcome (Astin 1991, Pascarella & Terenzini 1991, Kuh 2001, Lizzio, Wilson & Simons 2002, van der Hulst & Jansen 2002). These studies are often based on comprehensive data sets and are sometimes methodologically sophisticated. Theoretically they are, however, in general based on rather simple input – output models. The aim of this paper is to demonstrate that more elaborated theoretical perspectives are appropriate in analyses of quantitative data on student learning outcome. A better understanding of professional knowledge and learning processes may open up for alternative interpretations. Moreover, the application of these theoretical perspectives on quantitative data provides empirical confrontations of a different kind than the case studies from which they have been developed. The paper may, therefore, contribute to further development of our theoretical perspectives. The intention is, however, not to conduct some kind of hypothesis testing. Contrary to most quantitative studies the ambition is explorative rather than deductive.

Analytical perspectives

The aim of professional education is to make a distinctive contribution to students’ knowledge base and their socialisation into the occupation. Development of professional knowledge is, however, a continuous process and important elements of the knowledge may first be really

developed during occupational practise. The fact that professional graduates lack important knowledge is therefore not necessarily a weakness of the respective educational programmes. An important question is what types of knowledge are best learned in higher education, what are best learned in professional practice and what are best learned through an integrated course involving both contexts (Eraut 1994:100-122). These questions could of course only be answered examining the different types of professional knowledge and tasks in detail, but are essential as a point of departure in all studies of development of professional knowledge.

Apprenticeship models (e.g. Kvale & Nielsen 1999) and perspectives on “communities of practise” (Lave & Wenger 1991, Wenger 2000) have challenged traditional learning theory. The social-cultural perspectives tend, however, to ignore that learning is not locked into local settings, but produces and organises networks across space and time. Focus should therefore be directed to the process around the incorporation of students into specific temporal and spatial organisations of knowledge: how students *get connected to knowledge* (Nespor 1994). Furthermore, including the concept of “*wanting structure*” brings into view underlying unfolding processes and dynamics rather than isolated reasons, as does the traditional vocabulary of motives, intentions and actions. The interest of knowing appears never to be fulfilled by final knowledge (Knorr Cetina 1997, 2001). Using the terms “*wanting structure*” and “*connectedness to knowledge*” emphasise that learning is a social activity rather than one taking place within isolated minds. It is also a way of trying to get around the dichotomies between a pure sociological and a psychological approach. Nevertheless, it should be emphasised that the concepts are borrowed and used in a rather loose sense to fit the purpose of the present paper.

The term “knowledge” is used to refer to the whole cluster of aspects related to professional competence. As emphasised by Eraut (1994:16) it may be appropriate to use the concept to address all aspects of knowledge relevant for professional work to avoid getting embroiled in definitional issues. It is reported that the boarder between theoretical and practical knowledge has become blurred (Henkel 1994) and a question could be raised as to the extent to which the different types of knowledge may be distinguished as separate and independent forms.

To examine the extent to which students are connecting to professional knowledge during college, students in nursing, teaching, and administration have been put into focus. As educational programmes they differ in their classification of knowledge, academic and practice-oriented traditions as well as curriculum characteristics. Based on an examination of the curricula in these programmes it is analytically differentiated between three aspects of professional knowledge - *specific knowledge*, *practical skills* and *reflexivity*. These aspects are important in all the professional fields. The focus on these aspects could also be based on theoretical arguments. The division between theory and practice may for example be based on Aristotle who distinguished between “technical knowledge” and “practical knowledge” and Ryle (1949) who used the terms “knowing that” and “knowing what”. A basic characteristic of professions is that they combine propositional knowledge such as discipline-based theories and concepts and process knowledge based on impressions, interpretations and experience (Eraut 1994). Reflexivity is less emphasised in the literature on professional knowledge, but Schön (1983, 1987) has stressed the value of reflection in the development of knowing-in-action into knowledge-in-action and Eraut (1994) argues that deliberate processes lie in the heart of professional work which involve intuitive as well as analytical thinking and discussion. Moreover, Beck (1992) uses reflexivity to refer to self-confrontation with the effects of risk society. It may be argued that reflexivity is particularly important in professional work because it is a way of opening up established ways of thinking not just for improvements but also for fundamental objections. Reflexivity may also be a way of recognising clients and lay audience points of view as constructive contributions to knowledge.

To shed light on the process of connecting student to the three aspects of professional knowledge it is focused on students’ expectations when they enrol in the various programmes, their assessment of the extent to which they have been connected to knowledge in their final term and how their connection to the various types of knowledge relate to their assessment of challenges associated to their transition to professional work.

The research questions are:

Expectations: Do students' expected educational outcomes in terms of specific knowledge, practical skills and reflexivity vary between the educational programs when also individual characteristics are considered?

Connection to knowledge: What are the relationships between students' expectations and their experienced educational outcome in terms of specific knowledge, practical skills and reflexivity when individual and curriculum characteristics are also considered?

Transition to work: What are the relationships between students' connections to knowledge in terms of specific knowledge, practical skills and reflexivity and their assessment of various challenges related to transition from study to professional work?

Data and methodology

The data are drawn from a longitudinal Database for Studies of Recruitment and Qualifications in the Professions (StudData) in Norway. StudData contains responses to questions covering a wide range of issues. Data from the first wave included several background variables as well as data on their motivation and expectations. Wave 2 includes questions on study efforts, their assessment of various aspects of the educational programmes, satisfaction, gain and expectations for the future. In wave 1 about 2300 students from different programmes and university colleges received the questionnaire and the response rate was 74 per cent. In wave 2 the number of programmes and institutions was extended somewhat, 3700 questionnaires were distributed and the response rate was 75 per cent.

The present paper is based on responses from three professional groups: nursing (N=437), teacher-training (N=559) and administration (business administration, public administration and accountants N=193). The students answered a questionnaire when they started their studies in the autumn 2000 and when they were in their final term the spring 2003. Even though the response rate varied somewhat between the educational programmes at the different institutions, the lowest rate was just below 60 per cent, which is considered acceptable. The critical factor is the panel retention due to dropouts and absence in wave 1 or 2. The questionnaire was distributed to and completed by students during their lectures. This means students that for various reasons did not attend the current lecture were not included in the survey. The estimations of the response rates are, however based on the total number of

students enrolled. Missing response is therefore a complex issue and will be examined more closely in another context. In the data set which is the basis for this paper 559 answered the questionnaire in both waves, while 420 responded only wave 1 and 210 answered only wave 2.

To assess the relationship between the different individual and contextual variables simultaneously multiple regression analyses have been conducted. The independent variables like age, gender and uncertainty in choice of study programme should not need any further explanations. Marks from upper secondary school are average marks achieved in Norwegian, mathematics, English and science. From abroad is defined as being born outside Norway or taking another language than Norwegian to parents. Active study strategy is an index based on eight items assumed to measure academic integration. Time for studies is average hours for study per week including organised instruction as well as individual activities. Teaching quality is an index based on students' assessment of various aspects of the instruction and their teachers, while social climate is an index based on their assessment of the milieu and whether it is a supporting climate among the students. Educational programmes are included as dummy variables using nursing as reference group.

The dependent variables are students' expected educational outcome in terms of specific knowledge, practical skills and reflexivity ("Ability to critical reflection and assessment of own work") on a five-point-scale in wave 1, and students' assessment of their outcome on these dimensions in wave 2. Analyses of transition from study to work are based on students' assessment of the following statements: "I am anxious for not mastering work task according to expectations", "I will get professionally interesting work tasks", and "I will need regular supervision and observation the first year at work" on a seven-point-scale.

Results

Expected outcome

Individual characteristics seem to some extent to be related to students' expectations for the various types of knowledge (Table 1). Students who are not certain that they have chosen the right programme report lower expectations for practical skill and reflexivity than students who are more certain in their educational choice. Male students have lower expectation for specific knowledge and practical skill than female students, and age is positively correlated

with expectations for specific knowledge. Marks and national origin seem, however, not to be related to expectations for any aspects of professional knowledge.

Students' expectations in the three educational programmes differ significantly. Nursing students report higher expectation for practical skills than students in administration and teacher training and higher expectations for specialised knowledge as well as reflexivity than students in administration. Alternative analyses show that there also are significant differences between students in teacher training and administration with the respect to their expectations for all aspects of professional knowledge.

Table 1 Students' expected educational outcome in terms of specific knowledge, practical skills and reflexivity. Multiple regression coefficients (B) and standard error (S.E.). N=816.

	Specific knowledge		Practical skills		Reflexivity	
	B	S.E.	B	S.E.	B	S.E.
Constant	4.375 ***	0.184	5.439 ***	0.224	4.110 ***	0.197
Uncertain choice	-0.038	0.022	-0.152 ***	0.027	-0.135 ***	0.023
Gender (ref.=female)	-0.282 ***	0.059	-0.383 ***	0.071	-0.083	0.063
Age	0.017 ***	0.005	-0.003	0.006	0.010	0.005
From abroad	-0.075	0.115	-0.146	0.140	-0.044	0.123
Marks	0.004	0.025	-0.011	0.030	0.033	0.026
Teachers (ref. nurses)	0.032	0.057	-0.677 ***	0.069	0.076	0.061
Administration (ref. nurses)	-0.494 ***	0.078	-1.248 ***	0.095	-0.261 **	0.084
R ² adj.	0.116		0.303		0.075	

*** p<0.001, **p<0.01, *p<0.05

Connection to knowledge

While individual characteristics are somewhat related to students expected educational outcomes, there are no such relationship between these variables and students assessment of their connection to the various aspect of professional knowledge (Table 2). Their expectations for the various types of outcome in the first term are, however, positively related to their connectedness to these aspects respectively in the final term: the higher expectations the higher connection to professional knowledge. Furthermore, teaching quality is positively related to students' connectedness to specific knowledge and practical skills, while the social climate among students is positively related to their connectedness to practical skills. These contextual factors seem on the other hand not to be related to students' connection to reflexivity.

The differences in connection to knowledge between students in the three educational programmes are about the same as for students expected outcome. Nursing students are to a greater extent than students in teachers training and administration connected to specific knowledge and practical skills and they are to a greater extent connected to reflexivity than students in administration. Alternative analyses show that there are also significant differences between students in teacher training and administration with the respect to their connection to all three aspects of professional knowledge.

Table 2 Relationships between student connection to specific knowledge, practical skills and reflexivity. Multiple regression coefficients (B) and standard error (S.E.). N=448.

	Specific knowledge		Practical skills		Reflexivity	
	B	S.E.	B	S.E.	B	S.E.
Constant	2.325 ***	0.431	2.936 ***	0.445	2.599 ***	0.430
Uncertain choice	-0.050	0.035	-0.044	0.037	-0.038	0.039
Gender (ref=female)	0.098	0.096	-0.023	0.097	-0.157	0.102
Age	-0.003	0.009	-0.017	0.009	0.012	0.009
From abroad	-0.265	0.178	-0.184	0.180	0.005	0.193
Marks	0.012	0.040	-0.051	0.040	-0.053	0.043
Study strategy	-0.006	0.047	-0.008	0.048	0.058	0.051
Time for studies	0.004	0.004	-0.001	0.004	0.004	0.004
Teaching quality	0.151 ***	0.039	0.151 ***	0.040	0.038	0.043
Social climate	0.038	0.030	0.068 *	0.030	0.040	0.032
Expected outcome	0.122 *	0.055	0.163 ***	0.047	0.171 **	0.057
Teachers (ref. nurses)	-0.198 *	0.095	-0.345 ***	0.103	-0.008	0.102
Administration (ref. nurses)	-0.433 ***	0.133	-0.911 ***	0.148	-0.830 ***	0.141
R2 adj.	0.06		0.204		0.151	

*** p<0.001, **p<0.01, *p<0.05

Transition from study to work

Students were also asked to assess different statements related to their transition from study to professional work. Table 3 shows that the individual background variables are somewhat related to their assessment of these statements. Female students are more anxious of not mastering the tasks than male students. Older students are less anxious than younger students, but the former do to a less extent expect that they will find the professional work tasks interesting than the latter. Students from abroad are less optimistic than native Norwegian student concerning this last statement.

Table 3 Relationships between students' assessment of statements on transition from study to work, individual background variables and their connection to professional knowledge. Multiple regression coefficients (B) and standard error (S.E.). N=645.

	Anxious not mastering work tasks		Interesting work tasks		Need for supervision	
	B	S. E.	B	S. E.	B	S. E.
Constant	7.663 ***	0.590	4.252 ***	0.358	5.756 ***	0.504
Gender (ref=female)	-0.716 ***	0.185	-0.209	0.112	-0.197	0.158
Age	-0.038 **	0.013	0.024 **	0.008	0.006	0.011
From abroad	-0.232	0.315	-0.879 ***	0.191	-0.460	0.269
Specific knowledge	-0.213 *	0.095	0.253 ***	0.057	-0.003	0.081
Reflexivity	0.044	0.089	0.119 *	0.054	0.053	0.076
Practical skills	-0.086	0.088	-0.016	0.053	-0.159 *	0.075
Teacher training (ref. nurses)	-1.018 ***	0.171	-0.237 *	0.103	-0.600 ***	0.146
Administration (ref. nurses)	-0.616 *	0.246	-0.637 ***	0.149	-0.755 ***	0.210
R ² adj.	0.103		0.128		0.035	

*** p<0.001, **p<0.01, *p<0.05

Analyses also show that student assessments of the statement concerning their transition to work are related to their connection to professional knowledge. Students assessment of whether they are “anxiousness of not mastering work tasks” and whether they will “need regular supervision and observation” are significantly correlated (Pearsons $r=0.49$), but in the regression analyses students assessments of these two statements turn out to be related to students' connection to different aspects of knowledge. Connection to specific knowledge is negatively related to students' anxiousness of not mastering work tasks while connection to practical knowledge is negatively related to need for regular supervision and observation. Connection to specific knowledge as well as reflexivity are positively related the statement that their will find the work tasks interesting.

There are significant differences between the three educational programmes in students' assessment of these statements. Students in teacher training and administration are less anxious for not mastering work tasks, they think they to a less extent will need regular supervision and observation and to a less extent that the work tasks will be interesting than students in nursing. Alternative analyses show that students in administration are more anxious for not mastering work tasks and are less optimistic whether the work task will be interesting than students in teacher training.

Discussion

The aim of this paper is to shed light on the extent to which students become connected to professional knowledge during their college education. Considering the individual background variables it is interesting to recognise that gender, age, national origin, uncertainty in educational choice as well as former marks seem not to be related to students' connection to knowledge. It is argued that students' reports on gain is feasible and in many respect the only source of useful data (Kuh, Pace & Vesper 1997). This type of variable is nevertheless based on student own evaluation and are not related to the outcome of other student or more objective measures on educational success. We are therefore measuring a kind of "added value" which not seems to be affected by students' background characteristics. The lack of such a relationship could be regarded promising considering the quality of future professional work. Since individual variables first of all are included as control variables they are not discussed further in this final section.

Curriculum characteristics and study efforts

Research literature indicates that students' efforts, approaches and how they spend their time are important for students' educational outcome (e.g. Pascarella & Terenzini 1991, Prosser & Trigwell 1999, Koljatic & Kuh 2001). This is not confirmed in our analyses. The reason why hours used for studies as well as study strategies have no significance may be that students' in professional programs adjust their efforts according to what is considered sufficient. Our results should, therefore, not be interpreted as an indication that students do not improve their educational outcome if they use more time or if they develop more active and critical study strategies. Students' assessment of teaching quality is however positively related to their connectedness to knowledge in terms of specific knowledge and practical skills, while their assessment of the social climate among students has a positive relationship to practical skills. The importance of social climate and integration is central in prior studies especially of student drop out (Tinto 1998). Also the significance of students' perception of teaching environment is confirmed in the literature (Lizzio et al. 2002). Review of validity and reliability of students' evaluation of teaching indicate that students are apparently able to discriminate their instructors' strengths and weaknesses, at least when ratings are aggregated over many students (Marsh & Bailey 1993).

Our results indicate that study quality rather than student efforts are most important for connecting student to knowledge. One reason may be that professional programmes are more teaching intensive and less based on students own study activity than traditionally academic programmes (Aamodt 2003). Further development of students' connection to professional knowledge during their occupational carrier depends, however, on their understanding of the relevance and potential of professional knowledge and presupposes an active knowledge strategy.

The differences between the educational programmes in students' expectations as well as their connection to knowledge could be regarded as an indicator on the quality of the respective programmes. In such a perspective the educational programmes in nursing seem to be of higher quality than the programmes in administration and teacher training. Students in nursing are, however, in general significantly less satisfied with their education than students in other programmes (Mastekaasa 2003, Smeby 2004). On the one hand this illustrates the problem of developing reliable quality indicators. On the other hand, considering the concept of wanting structure, the apparently contradictory results may be interpreted as reasonable since becoming connected to knowledge also implies recognition of lack: objects of knowledge structure desire, or provide for the continuation of the structure of wanting (Knorr Cetina 1997). A high level of connection to knowledge may therefore correspond to dissatisfaction with educational quality, since such connection also implies that students have recognised lacks in professional knowledge.

Differences between educational programmes in expectations and connection to professional knowledge should, nevertheless, also be related to differences in the respective fields of knowledge. Studies indicate that a critical perspective is more likely to be endorsed in soft fields such as arts and humanities than in hard fields such as the natural sciences (Lattuca & Stark 1994, Becher & Trowler 2001). This may be why students in nursing expect and connect to reflexivity to a greater extent than students in administration. It may be difficult to distinguish clearly between the knowledge base in nursing and administration according to a hard – soft dimension. Nevertheless, even though exact medical knowledge is included in nursing, the use of mathematics and logical statements are more common in the latter than the former program. Furthermore, learning how to handle discretion in a professional way is

probably more central in nursing than in administration. Discretion is a type of qualifications that presupposes reflexivity. Furthermore, it is almost self-evident that some professions are considered more practical than others. While practice composes 50 per cent of the study in nursing and about 20 per cent in teacher training, it is no organised practise in administration. Practical skills may of cause be learned in different types on learning contexts. Even so, differences between the professional programmes in students' expected as well as connection to practical skills seem to be highly related to the proportion of practise in curriculum.

Desire and wanting structures

Our analyses show that students' expectations for the different aspects of professional knowledge when they enrol are positively related their connectedness to the respective aspects in the final term of study. This corresponds with results in prior research which indicate that student motivation is positively related to performance, especially when it corresponds with discipline specific goal structures (Breen & Lindsay 2002). Students expectations or desires for professional knowledge when they enrol are, however, not part of a wanting structure since they are not developed related to the professional knowledge objects. As Knorr Cetina and Bruegger (2002:178) states it: "the object must not only have lacks but must be *signalling* what it still lacks and the subject must be *interpreting* these signals" (original italics).

Nevertheless, students' expectations should be regarded as resources for the development of such wanting structures. Students have to understand and experience that the various aspects of knowledge which are essential in their professional competence also are characterised by lacks. While emphasising the importance of critical attitudes to knowledge corresponds with the traditional ideals of higher education (Delanty 2001, Freidson 2001), the notion of wanting structure is to a less extent incorporated in an academic underestimation of applied types of knowledge. Moreover, it puts into focus the interplay between students' expectations and curriculum structures and characteristics. Finally, and may be most essential, it is a way of conceptualising knowledge which addresses the relationship between education and professional practice.

In this paper connection to knowledge is operationalised as students assessment of their study outcome irrespective of whether this implies that they have developed a wanting structure or not. Students assessment of challenges related to the transition form study to work may,

however, give some indications on whether students connection to the various aspects of knowledge has, or has the potential of being developed into a wanting structure in terms of an active relationship to the professional knowledge objects. Students' connection to specific knowledge seems to reduce their anxiousness of not mastering tasks and their connection to practical skills reduces their assumed need for supervision. A reasonable interpretation is that students' connection to professional knowledge is positively related to their feeling of being prepared for professional work. It should be emphasised that our data shed light on students' expectations not their experience of the transition from study to work. Students' anxiousness of not mastering tasks and assumed need for supervision could be regarded as positive and realistic expectations concerning the challenges related to the transition to work. Irrespective of students connection to professional knowledge they realise that professional knowledge also is characterised by lacks. In such a perspective it is interesting that students' connection to specific knowledge as well as reflexivity is positively related to their expectations that the professional task will be interesting.

Terms such as "practice shock" illustrate that transition from study to work is difficult and a personal strain. One way to cope with these difficulties and knowledge lacks is to adapt the tacit knowledge and procedures of professional practice at the workplace. Another strategy is to recognise that knowledge lacks is an interesting challenge in professional work. Students in nursing report a higher connection to knowledge than students in teacher training and administration, and the former are more optimistic than the latter concerning whether they expect the task will be interesting. The reason why nursing students are more anxious for not mastering task and expect that they will need more supervision and continuous observation than students in administration and teacher training may be that the consequences of doing mistakes may be more dramatic in the former than in the latter profession. The proportion of practice in nursing curriculum as well as the students' connection to knowledge may however also imply that these students have experienced lacks in professional knowledge to a greater extent than students in the other educational programmes and that they therefore to a greater extent have developed a wanting structure.

Preliminary conclusions

Students have in general high expectation concerning their educational outcome.

Development of professional knowledge is, however, a continuous process and important elements is best learned in occupational practise and further education. The challenge is to meet students' expectations and provoke their curiosity in a way that connects them to professional knowledge. Students' experiences of lacks in their professional education and anxiousness of whether they will master professional task should not only be interpreted as weaknesses of educational programmes. It could also indicate that they have developed a wanting structure.

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